DOCUMENT RESUME

ED 319 575 RC 017 564

AUTHOR Matthews, Doris B.
TITLE Relaxation Theory for Rural Youth. Research Bulletin No. 46.
INSTITUTION South Carolina State Coll., Orangeburg.
SPONS AGENCY Cooperative State Research Service (DOA), Washington, D.C.
PUB DATE Sep 89
NOTE 48p.
PUB TYPE Information Analyses (070) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Adolescents; *Anxiety; Biofeedback; Coping; Educational Research; Elementary Secondary Education; Literature Reviews; *Preadolescents; *Relaxation Training; Rural Education; Rural Youth; *Stress Management; Stress Variables; *Training Methods

ABSTRACT

This document synthesizes research findings to formulate a theory to guide relaxation training in educational settings, particularly rural schools. Young people experience many intense life events that require coping skills or relaxation. Family-related stress factors include instability in the home, lack of a support system, conflicting values, sibling rivalry, and family mobility. In school, children may experience stress related to academic achievement or social relationships. Community-based stressors include the technology explosion and world problems. For 5 years, researchers trained 10- to 18-year-old students in relaxation, using biofeedback, guided imagery, autogenics, and deep breathing. The resulting theory of relaxation holds that: (1) relaxation training decreases arousal, with high-anxious persons more capable of change than low-anxious persons; (2) students evoke the relaxation response easily but have difficulty evoking arousal; (3) all training techniques are suitable, with cognitive methods more effective with extended practice; (4) practice creates an incremental effect; (5) personal training is more effective than cassette programs; and (6) biofeedback instrumentation enhances measurement of relaxation states. Relaxation training improved students' self-management skills, decreased state anxiety, increased girls' social interaction skills, improved self-concept, reduced test anxiety, and raised test scores and achievement. This document contains 136 references and suggestions for implementation of a system-wide stress management program. (SV)

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Research Bulletin No. 46 **September, 1989**

Relaxation Theory for Rural Youth

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In cooperation with
Cooperative State Research Services
United States Department of Agriculture

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ACKNOWLEDGMENTS

Any project of this size and complexity, a study comprising five years, must necessarily involve the cooperation of many people. Therefore, it is a pleasure to acknowledge specially the contributions of the numerous others who helped to make the effort a success across disciplines, jurisdictions, and levels of expertise. The Principal Investigator regrets that she cannot mention everyone, but the eleven participating schools in the study entitled *Correlates of School Stress*, for example, must remain anonymous.

Research personnel formed into two categories: a small research staff and a much larger ancillary group of volunteers, supplementary professionals and consultants, and subjects with supportive parents. The research staff at average strength consisted of two assistants of differing responsibilities. They provided efficient and constructive support during the particular phases of the study. In particular, Ms. Barbara Lin Odom, a seasoned educator, provided both field assistance and word processing expertise. Ms. Beulah El-Amin was a resourceful field assistant and research specialist. Others of the staff at various times were Ms. Debra Kean and Ms. Karan Griggs.

Of the much larger group of temporary helpers, those to whom great gratitude must go in proportion to their services are the data analysts. Of particular assistance was Dr. Jimmy L. Quinn, who helped design the phases of the research and provided consultative services thereafter. Essential contributions also came from Dr. David Burnett and Mr. Jim Casteel.

Teachers whose industry accelerated the progress of the research project were from Felton Laboratory School at South Carolina State College: Ms. Joann R. Berry, Ms. Janie P. Burgess, and Ms. Wanda Felecia Johnson. Ms. Oscarola Pitt, Director of Felton Laboratory School, was helpful, as was Ms. Carolyn J. Woodbury, Counselor, and Ms. Juliet M. Floyd, Administrative Assistant.

Thanks also go to administrators and faculty at Orangeburg-Wilkinson High School for their participation in the study entitled *The Effect of Timed Relaxation on Keyboarding Achievement.* Ms. Georgia Montgomery coordinated the study with personnel in the central office in the school district and with administrators and faculty at her school. Outstanding on the faculty were Mr. Heyward Bozard, Jr., and Mr. Mason Turner, who assisted Ms. Odom, of the research staff, with keyboarding instruction.

It is also a pleasure to recognize gratefully the cooperation of over six thousand students who participated in various phases of the research. In addition, supportive parents made the studies possible by granting permission for their children to engage in the program.

Thanks must go to the School of Education at South Carolina State College for supplying office space. Because of cooperation from administrators and employees in the School of Education and the Department of Counselor Education and Psychological Foundations, the research progressed on schedule.

No study is successful without pleasant and near-superhuman efforts on the part of librarians. In that respect, the librarians of the Miller F. Whittaker Library at South Carolina State College did not stint in their assistance in exploiting the resources of their institution.

Funding and support personnel facilitated the research. Persons of leadership were Mr. Leon G. Chavous, Director of 1890 Research and Extension; Dr. Robert L. Hurst, retired Vice President for Research and Extension; and Dr. James H. Walker, Jr., Senior Associate Research Director. Giving invaluable support services were Ms. Madelyn F. Walker, Administrative Assistant to the Director of 1890 Research and Extension; Ms. Cynthia M. Pyatt-Green, Accounting Technician; Ms. Ella A. Smith, Administrative Specialist to the Director of Research; and Ms. Betty Key-Hubbard, Coordinator of the Clerical Center. The Office of 1890 Research, in cooperation with the United States Department of Agriculture, funded the completed study.

FOREWORD

The research, Empirical Tests for a Relaxation Theory with Rural Youth, was a five-year project that culminated in a Theory of Relaxation. The research consisted of the investigation of a number of hypotheses in five major studies: *The Effects of Timed Relaxation on Keyboarding Achievement, The Effect of Relaxation Training on Test Behavior in a Thinking Skills Program, A Comparison of Relaxation Strategies, Correlates of School Stress,* and *A Study of the Effects of a Stress Management Program on Affective and Cognitive Measures of Middle School Children.* The findings from the five studies in this research, two previous studies, and studies by other persons external to South Carolina State College were the bases of the resultant Theory of Relaxation for Rural Youth. This document concluded the research.

The five studies that were part of this research are available, as published, in separate bound volumes from the Principal Investigator and from ERIC (Education Research Information Center). The data are available, also, in over ten related articles in educational journals. The major articles, which are representative of the findings, are as follows:

- Relaxation training: A humanistic technique to increase achievement. (1987). *Journal of Humanistic Education and Development, 25*(3), 112-121.
- Guided imagery as a relaxation technique for improving achievement in an educational setting [Summary]. (1987). *Proceedings of the 18th Annual Meeting of the Biofeedback Society of America* (pp. 81-84). Wheat Ridge, CO: Biofeedback Society of America.
- Guided imagery as a relaxation technique for improving achievement in an educational setting. (1987). *Biofeedback and Self-Regulation, 12*(2), 154-155.
- The effect of relaxation training on test behavior. (1987). *National Association of Laboratory Schools Journal, 12*(1), 9-18.
- The effect of relaxation training on test behavior in a thinking skills program. (1988). *Social Science Perspectives.* El Cajon, CA: National Social Science Association.
- Imagery: An innovative technique for keyboarding achievement. (1988). *Clemson Kappan, 8*(2), 22-23.
- The effect of a thinking skills program on cognitive abilities of middle school students. (1989). *The Clearing House, 62*(5), 202-204.
- The effects of a self-regulation program on cognitive and affective behaviors of preadolescents. (1989). *National Association of Laboratory Schools Journal, 13*(2), 10-20.
- Anxiety: An achievement component. (1989). *Journal of Humanistic Education and Development, 27*(3), 122-131.
- Anxiety: A component of self-esteem. (1989). *Elementary School Guidance & Counseling, 24* (2), 101-112.

The cumulative research on which the theory is based has specific limitations. For example, middle school black children are overrepresented in several of the samples in the five studies. In addition, these sampled children were not only residents of one state but were also concentrated in the midlands, a distinct region, of that state. In outside studies, learning-disabled children outnumbered regular classroom children. Although the research of this principal investigator occurred mainly in the regular classroom, other studies used laboratories or situations dissimilar to the natural learning environment. The users of relaxation techniques had varying degrees of skill that could have caused differences in results. Relaxation training employed a variety of reputable techniques. Based on findings, then, had the theory focused on only one or two techniques, formulation of conclusions might have been different. Instrumentation, both biofeedback and self-report scales, possibly had biases. However, the theory provides principles that can propel the research as needed.

INTRODUCTION

Educators long lacked any systematic theory to guide the development of relaxation or stress management programs in the school. Efforts toward forming such programs were sporadic, sometimes reported to be successful, but no standardized procedures existed in a clear form for widespread implementation of a specific program for which there was a demonstrably increasing need.

The purpose, therefore, of this enterprise from its inception was to synthesize inhouse and outside research to provide a theory to guide relaxation training in schools of every degree and in any setting, particularly rural. The investigations of educators repeatedly demonstrated a lack of agreement on organization and implementation, and explorations without a universal, systematic theoretical guide. The present document examines the need for school programs, and for the development of a theory with suggestions for implementation in the area of a coherent and effective stress management program. The theory exists as a basis, indeed, for further testing.

NEED FOR TEACHING THE SKILL OF RELAXATION IN THE SCHOOL PROGRAM

A central factor of human development involves coping with stressors found in the environment. Individuals continually have confrontations with a stream of potentially threatening and challenging situations that require action and adaptation.The modest to moderate correlations found between stressful life events and distress during youth (preadolescence and adolescence) suggest that various factors affect the amount of stress a student experiences (Compas, 1987). The resources available to cope with stressors and the manner in which individuals actually cope may be important factors influencing patterns of positive growth and development as opposed to the onset of psychological and physical problems.

In the environment of young people, many intense life events exert pressure that requires the skills of coping or relaxation (Omizo, Omizo, & Suzuki, 1988). These life events generally fall into categories of family, school, and community.

INFLUENCE OF FAMILY STRESS

Family life, which often serves as a buffer for youth, can also be a source of stress for them. The ordinary aspects of family life may accumulate to create demands for children that can range from mild to overwhelming in regard to stress. Among the many causes of tension and disharmony are: (l) the instability of family life; (2) lack of the usual family support system; (3) the effects of an unstable, conflicting set of values; (4) rivalry of siblings; and (5) consequences of the physical mobility of the family.

Instability in the Home

Youth need relaxation skills in order to adjust to stress caused by the constant instability found in many homes. For some children, home life is stressful because of serial partners within cohabitational arrangements and the demands that the situation places on them. Other children find the uncertainties of a

single-parent home literally crammed with anxiety. Still other children must adapt to divorce, remarriage, and blended households.

According to Elkind (1981), divorce is second on the list of stressful life events; only death of a parent supersedes this factor. Divorce is in fact traumatic for children, who often blame themselves for the familial dysfunction (Rhiner, 1983). Children feel ashamed and may try to keep the divorce a secret from schoolmates. Youth have difficulty expressing feelings to anyone else, but especially to their parents, because they do not want to burden their parents further or feel that they may not understand (Hafer, 1981). Children may be torn between the two parents, as both adults strive for their affection. However, a youth may become the confidant of the parent with whom the child lives and may be forced to act more like an adult friend than like a child. In comparison to children in two-parent families, children of divorced families and single-parent homes may have to assume more housekeeping tasks and childcare for younger brothers and sisters and may have to deal more with adults in a business or professional situation.

Support System

The instability of the home lessens the likelihood of an adequate support system in the family to buffer the many stressful life events (Compas, 1987). Extended and nuclear families are no longer the norm because single-parenting and other types of lifestyles tend to dominate the home arena (Visher & Visher, 1983). Social support involves belonging, being accepted, being loved, or being needed all for oneself and not for what one can do for others. In other words, it means having people with whom one can talk and share joys, problems, apprehensions, and love and people who expect nothing in return. When youth turn solely to their peers for the support system, they are open to peer exploitation, emotional blackmail, and people their own age who recognize their vulnerabilities immediately and act ruthlessly upon them. To be so caught creates an extremely stressful situation.

Unstable Value System

The wide range of choices open to preadolescents and adolescents, who are themselves busily establishing their own value systems, may be one of the prime causes of stress (Garbowsky, 1984). Making choices adds burdens at a time when the body is already enduring stressful biological and emotional developments. Fast and easy transportation and accelerated communications hasten the struggle: for example, friends may have large amounts of unexplained spending money; artful and scientific advertising agencies purvey promises and anxieties; or certain kinds of inappropriate excitement may appear both handy and harmless.

Authoritarian parents leave no verbal doubt relative to their own value systems and seek to impose them, with potentially stressful results. Literally absentee parents may have lived their values without verbalization with perceived indifference and irresponsibility. The problem is probably not permissiveness

(Garbowsky, 1984) but rather stress caused by processing alternatives in an authoritarian environment during a hectic spurt in development. Thus, the young person has no automatic curb on making choices to use narcotics, including alcohol and tobacco; to abandon academic commitments; or to abide by standards of personal conduct deemed appropriate by external authoritarian figures.

Young people quite naturally look for role models because such models appear to have made choices and to copy will be easy. Peer acceptance, however, becomes more complicated than the young person has anticipated. Adolescents from a traditionalist home will carry with them the values verbalized there that may have been enforced by grandparents, parents, siblings, and members of an extended family. In the heavily authoritarian family, the dominant male or female sets the policies by which all others in the household are governed. Enforcement is sure and sometimes stressful to sensitive children. Some children will carry over the security of patterned behavior; others may become pathologically rebellious. Young people from the nontraditional or unstructured home, on the other hand, may have trouble coping with results of inappropriate decisions they have made on their own.

Sibling Rivalry

Sibling rivalry creates stress rather intensely in a society becoming urbanized and increasingly affected by divorce. Among conventional families, sibling rivalry occurs in competition for parental time and affection. Young people have trouble realizing that favoritism of some sort is inevitable, yet relative, and that impartiality would eventually be detrimental: for example, no son would wish to be treated exactly like a daughter. Some daughters resent their being female because they view their household assignments as stereotypical and demeaning as against perceived male freedom. Unless parents provide more than one telephone line, there is competition for use of the telephone. If age differences are considerable, younger siblings will resent freedoms granted older siblings while ignoring the corresponding responsibilities. Some parents, tired of squabbling over use of television sets and music reproduction systems, purchase one set for every member of the family; others are more than content to purchase only one and to contend with unpleasantness concerning allocation of time and type of program. If the family has limited access to vehicles, sibling rivalry exists over transportation, with one or more siblings upset over what they regard as favoritism or insensitivity. Stress results from sibling rivalry for friends; the problem intensifies when the dating era begins.There can also be intensified rivalry in the arena of school. Some siblings may resent all the attention flowing toward the better students in the family and, thus, feel inferior or unloved. Awarding cash for academic performance aggravates the difficulty.

Birth order conventions often produce stress. The oldest child frequently resents delegation of surrogate parenting responsibilities and the perceived disproportionate amount of chores required. Middle siblings sometimes have confusion of role models, with much security dependent on the treatment the

older siblings bestow, or resentment toward younger siblings who seem irresponsible and pampered.

Divorce, with resulting blended or binuclear families, often intensifies sibling rivalries. Parental competition translates quickly into sibling hostility, and the best intentions of stepparents may forever go unappreciated and unrecognized as the children jockey for supremacy and what they consider to be survival in a hostile world.

Family Mobility

Families change their residences frequently because of changes in work assignments (Rhiner, 1983). With each move, youth have to adjust to a new school and have to make new friends. Some children cannot handle such frequent changes without excessive stress.

A move during the preadolescent years is particularly devastating (Elkind, 1986). Children in this period of development form cliques or support groups external to the family and are generally cruel in rebuffing newcomers. The child, already stressed from the insecurities of the strange domestic and social environments, sometimes feels forced into aberrant behavior in order to become rapidly accepted and assimilated. The art of social patience is not yet fully developed, and responsible people need to exercise special care in observation and remediation.

School Stressors

Preadolescents and adolescents spend a major portion of their waking hours in the school setting. Thus, the stress associated with school may constitute a large portion of the total stress experienced in their lives (Forman & O'Malley, 1984). According to Phillips (1978), two major categories of stressors, achievement and social, exist for students in traditional schools. Achievement stressors relate to mastery of academic subject matter and evaluation of performance. Social stressors relate to relationships with peers, interactions with teachers, and participation in classroom and extracurricular activities.

Achievement Stressors

Because of the information inundation, schools today present more data than in past years and, generally, start the presentation at earlier levels. By middle school, the child suffers bombardment not only from the basics of education but also from high-level concepts related to mathematics, science, social studies, and language arts. Brain development of many youth is such that high-level conceptualization is impossible at this age, and the dissonance caused by school demands and student capability creates much stress (Toepfer, 1981). As the child moves into high school, the realization that college acceptance, peer approval, and home rewards depend on grades creates fierce competition that causes in its turn excessive stress for some youth. For those students who feel that the rewards are beyond their attainment, feelings of helplessness occur, thus creating stress of

great magnitude. Children from low socioeconomic levels frequently experience the latter type of stress (Grant & Grant, 1982).

Much anxiety for youth in school is due to the current preoccupation with testing (Brandt, 1989; Rhiner, 1983). Standardized testing is now a regular part of school life for the majority of youth. Promotion from grade to grade or from a course depends partially on standardized scores. Test results are often an excuse to brand children who score low as unteachables and to relegate them to the lower track or slow classes, where they may fall further behind. Using tests indiscriminately to compare students to classmates of the same chronological age can destroy the self-esteem of low-scorers and can give children who score high an inflated idea of their intellectual capacity. The current emphasis on testing tends to be emulating the European-Japanese model of advancement via examination, a model that creates so much stress that suicide is prevalent.

Lack of options in vocational programming or alternative schools creates stress for a large percentage of the population in middle and high schools (Bray, 1987; Donnelly, 1987). A drop-out rate ranging from 25 to 40 percent in some schools (Ekstrom, 1986) is a symptom of the stress being experienced by a segment of the school population. Although the pressure of making choices creates some anxiety, mismatching may cause even more stress; that is, there must be alignment among methodology, curriculum, student learning styles, and needs of students.

Social Stressors in the Classroom

Even the young person most highly regarded as sunny will undergo some kind of stress in the classroom and will require occasional assistance in reinforcing coping skills. Students less favored will require more assistance in proportion to lack of self-esteem or previous networking. Other students will have their problems magnified because of aberrant economic stressors (excessive wealth or excessive poverty); current crises, including friendship dissolution, death of a peer, failure in school, parental distancing, or overt or subtle ethnic prejudice expressed in the classroom by the teacher or peers (Grant & Grant, 1982); exclusions from activities, teasing, or tormenting; intentional or insensitive personal ignoring—roughly perceived as Coventry; hostile rejection for infringements of codes and routines about which the student has not been informed; indelicacy or insensitivity toward a handicap or impediment; or coldness toward the shy student who responds slowly or warily toward overtures. This age group may develop morbid concerns over their own personal appearance, for example. Preadolescents and adolescents, especially, have what they regard to be the security of their group status and cliques, and, if the students perceive themselves as threatened, can very quickly determine vulnerabilities of the interloper, exploit them, and remove effectively the threat. Because preadolescents and adolescents spend the greatest part of their days in the social environment of the school or classroom, students must learn at that place and time to cope with stress.

Community Stressors

Stressors from the community affect preadolescents and adolescents heavily. Community means human ecological structure and organization, from the simplest, which is the family, to the world, as it is now bound together by communication, trade, and transport. Community creates stress as upheavals occur, sometimes innocently enough, through seeming advances in technology affecting everything from producing food to reducing the population. As world problems emerge as personal experiences by way of the communications media, preadolescents and adolescents may have nightmares about massacres, multiple murders, terrorist violence, or images of famine victims seen on television or in publications. Problems such as AIDS, teenage pregnancy, and narcotics abuse intrude everywhere. Inadequate housing disrupts development and may distort the personality permanently. Terrorist attacks may traumatize more affluent preadolescent and adolescent travelers. The clash of ideologies, along with civil strife and extreme violence, may stunt and corrupt. As demographic realities sweep onward, young people will feel stresses and anxieties as they become forced to relate to living with diverse ethnic groups, particularly in milieus with traditions of ethnocentricity and no understanding or tolerance of cosmopolitanism. Thinking the unthinkable in terms of accepting traditional enemies, while easy for infants or toddlers, is frequently torture for older children struggling to find security in personal identity and attachment to some sort of stabilizing roots.

Technological Impact

Some might argue that school has reached a golden age of technology, with learning equipment and interconnections readily available to students in even remote and poor districts. In the yards of shacks, a visitor might even see a satellite dish. Hardware is already in many rural area venues of instruction. Problems arise, however, when planners realize that equipment is obsolete the instant it is installed, discs and videotapes and the information on them date rapidly; that teleconferences cannot serve indefinitely for updating; and that some information is too abstruse to be mastered by cursory visual or aural approaches. On the positive side, students at this age take readily to the use of equipment because it affords physical activity and contact; responds immediately, as in a game; and seems to personalize the learning process without embarrassing monitoring from teachers or tutors. Some students proceed at such a rapid pace that they risk burnout unless the appropriate challenging material can get to them quickly enough.

Other students, by contrast, begin to exhibit symptoms of anxiety. The learning pace accelerates, with expected performance levels rising speedily. Some teachers, approaching computers and telelessons rather late to assimilate them, transmit their own anxieties to the students. Parents, many of them too poor or busy to invest in home computers, are not yet committed to the technology and, therefore, do not understand the nature of encouragement for their offspring. They may exert negative pressure and thus produce stress. On the other hand,

the overachievers may ruin chances for success by their children simply because they exert the wrong type of pressure too intensely at an inappropriate time. A further stressor, often discussed, is the increasing rapidity of the creation of information and its dissemination. The word "explosion" is scarcely adequate anymore; rather, the situation resembles a cluster of simultaneous explosions with subsidiary explosions continuing indefinitely thereafter. It is certainly understandable that a maturating human being should feel anxious and overwhelmed, even if blessed with prodigious expertise in the operation of technology.

In an existence changing at a rate virtually out of control, middle and high school students must accept early two concepts vital to their futures: (1) the constant of change and (2) the expectation of the increasing rapidity of change, even to the ultimate mandating of changing careers from the obsolete to the viable (Elkind, 1986). In this changing existence, speed is the more important factor. Children need to accustom themselves to high transformational velocity that, thus far, has characteristically created anxiety among persons their age (Edmister & Lewis, 1983; Garbowsky, 1984; Yamamoto & Byrnes, 1984).

The school system attempts, in the face of rapid change, to align the anxiety of young people with their equally natural enthusiasm. Some students hurry along to be participants in the building of space stations and in traveling almost spontaneously to areas of space or on earth. Possibly, this age group becomes prominent in the exploitation of the potentialities in agribusiness or agronomy and attack problems of world hunger or create new foods and food products for a more interesting life. Or, on the basis of their classroom experiences, some children mature to discover the powers and pitfalls of worldwide communication. In such circumstances, students quickly discover the relationship of genetics and chemistry, or the connection among geology, astronomy, physics, and chemistry in the production of essential energy.

World Problems

While it is still a fact that some American communities are isolated and remote and feel independent, secure, and self-reliant, most now perceive the world to be a community. The world intrudes, whether in the form of a high-flying jet airliner, a polluted river, communications signals, or a targeted missile. Meteorological phenomena affect all: for example, climate vagaries cover extensive areas and weather comes from somewhere else. Preadolescents and adolescents may develop anxieties over the disappearance of their favorite wild animals, damage to the ozone layer, or the nonfictional nightmares of the Greenhouse Effect.

Advances in transportation and trade make formerly local concerns universal. Health problems crash any sort of political or other arbitrary line. If toxic substances or insect pests are in imported produce, for example, the distribution system makes the matter one of immediate concern for the family diet. The correlation of transport and such phenomena as AIDS and the fatal distribution of illicit narcotics extends problems to distant rural regions, affluent suburbs, and deteriorating urban ghettos alike. In the United States, teenage pregnancy is

a serious problem and more complex in motivation than first believed. Alleviation of hunger, both domestic and foreign, saps resources and affects development that has unforeseen application. Some nations have endemic crises in housing that can lead to political and marketing complications. The clash of ideologies intrudes, often with violence, and acts as an overwhelming stressor to young people who see homes, peers, and loved ones instantaneously destroyed. If the clash is carried into the community from alien quarrels, the disorientation and later hardening become almost inevitable. Such a world juxtaposes diverse ethnic groups, some traditionally hostile; thus, spirals and cycles of stress ensue. Too often the potential of a happily integrated planet remains unmet, and the disruptive result becomes yet another stressor with which to try to contend.

STRESS-RELAXATION DYNAMIC

Stress stems from a great variety of sources, as outlined previously. In general, stress is an adaptive reaction to the environment that increases the probability of the survival of an individual during pressing times. Usually, stress seems to stir one to commit oneself to action, whether to stand and fight or to flee the stress-provoking environment (Selye, 1974, 1976). The common experience of people under stress is that logical thought suffers impairment; contemplation vanishes; and concentration focuses on very few, perhaps irrelevant, aspects of the total sensory environment. For example, people rarely agree on the description of robbers in holdups. These witnesses do not think analytically and rivet their attention on details of the total situation that seem most important at the time. Subsequently, the same persons cannot identify what made that detail noteworthy. In short, people under stress tend to be doers, not thinkers. Historically, to act, rather than to think, served the race well. Recent times, however, made the nature of human life change dramatically. Modern persons need to think, plan, contemplate, reason, reflect, study, and learn more than did their forebears. Public school education, so much a part of life now, is nonetheless an innovation of very short history when viewed against the total time that people have been on the planet. In this environment, and in the work environment in support of which education is directed, action characteristically lies at the end of a long process of thought, but with the ironical necessity of making increasingly fast and informed decisions. Stress, formerly adaptive, becomes maladaptive in a world of such unsettling propulsion. Whereas cultures encouraged such responses in earlier times, society now discourages them, or demands them to be managed. Of course, stress continues to be a valuable commodity in some areas of human life. One must get "up" for most competitive activities, such as sporting contests and military exercises; that is, one must arouse oneself to a very high degree to perform at best. In most noncompetitive activities, on the other hand, stress is an unwelcome carryover from an earlier, more dangerous time.

Relaxation is the amelioration of stress. One devoid of stress cannot relax, being relaxed already. Most specialists concerned with stress (Anderson, 1978; Archer, 1982; Culligan & Sedlacek, 1980; Girdano & Everly, 1979; Sehnert, 1981)

believe that a certain level of stress probably is necessary to keep a person working on task and involved in an activity. Generally, however, in contemplative or reasoned activities, stress interferes with success. In such activities, relaxation generally improves performance. One must deal with stress effectively and immediately and with as much efficiency as possible. Relaxation results from using relaxation skills that are learned; from deliberate ignoring of the stress-causing situation; from concentrating attention on nonstressing concepts, places, or imaginings; from following attentively as some external source provokes one to relax (where the source may be a person using visual imagery, for example, either in person or on a recording); or from other, possibly quite idiosyncratic, strategies that one invokes consciously or unconsciously.

Definition of Stress

Stress represents the integral response of the body to stressors. The definition of stress encompasses the perception and evaluation of events and situations by the brain. The brain receives all kinds of stimuli that are translated immediately into terms of perceptions. The brain, on the basis of such perceptions, chooses how the body will respond, whether advantageously or with self-destructive negation. According to King, Stanley, and Burrows (1987), stress arises when the brain interprets the resources of the body as inadequate for the situation, event, or other dislocating factors.

Stress, therefore, is an increase in bodily activity based on brain responses to perceptions. The brain determines how much of a response is required and where the affected portions of the body will deal with the response. Arousal, that is, physical and mental activation, is the term given to this activity. Therefore, one might view stress on a continuum with low arousal at one end and high arousal at the other extreme. Overarousal and underarousal are states that tend to be associated with impaired mental and physical functioning. The relaxed state falls in the middle of the continuum and represents the range within which students function at maximum during waking hours.

When one reads the literature, the question of the connection between anxiety and stress arises. Anxiety, as usually understood, is an unpleasant state that is evoked by the appraisal an individual makes of a situation. Because this emotional response causes changes in the physiological body, anxiety and stress are interchangeable terms (King, Stanley, & Burrows, 1987).

Physiology of Stress

As a consequence of the seminal work of physiologist Dr. Hans Selyé (1950), educators and researchers are increasing their understanding of stress. Perhaps the most significant contribution by Selyé to an understanding of stress is his concept of the "general adaptation syndrome," a notion that helps one comprehend the effects of stress on the body. The general adaptation syndrome divides stress into three stages: the alarm reaction, the resistance stage, and exhaustion.

The ***alarm reaction*** entails bodily changes associated with emotions. The bodily changes are initiated by the sympathetic division of the autonomic nervous system. The sympathetic division increases the heart rate and blood pressure, and distributes blood more copiously to the exterior musculature.

In contrast to the sympathetic division of the autonomic nervous system, the parasympathetic division attends to the day-to-day functioning of organs. When one manifests emotion, the sympathetic division overrules the parasympathetic division, producing a number of symptoms. Under conditions of fear, blood circulation undergoes alterations; the blood supply to the viscera decreases while the supply to the exterior muscles of the trunk and limbs increases. Thus, the process of digestion halts in favor of increasing the potential for movement, either in defense or retreat. Concurrently, nervous impulses to the heart cause it to beat faster and harder; blood pressure increases and pulse rate accelerates. In addition to such alterations to normal circulation, the pupils of the eyes dilate and the mouth dries. As reported by Everly and Girdano (1980), Harvard physiologist Walter B. Cannon viewed such adaptation as preparation by the body to act or to flee; his term was the "fight or flight" response.

When the sympathetic division becomes ascendant over the parasympathetic division, the adrenal glands hypersecrete epinephrine (or adrenaline) and norepinephrine, hormones that empty directly into the blood stream. Epinephrine releases more blood sugar, thus making more energy available to the brain and muscles. Also, it stimulates the heart to beat faster. Therefore, epinephrine augments and complements the action of the sympathetic division. Norepinephrine constricts peripheral blood vessels, thus raising blood pressure.

If stress continues for some time, one enters the ***resistance stage.*** In this stage, one recovers from the initial outburst of emotion and attempts to endure the emotion-producing situation as well as possible. The attempt of the person to endure emotion places relatively high degrees of strain on bodily and psychological resources.

If the stress is overwhelming and the individual is unable to cope with or manage the stress, the person enters the third stage, ***exhaustion,*** in which all internal resources for managing stress are exhausted, even though the original sources of stress, called stressors, and any new stressors that may have arisen during the resistance phase continue to distress the individual. If exhaustion continues, its consequence is death.

Measurement of Stress

Biofeedback measures (physical) and self-report scales (psychological) are the two main ways that stress is measured. Biofeedback devices detect sympathetic arousal. Self-report scales depend on the honesty of the respondents; some students reply in socially acceptable ways.

Biofeedback

Biofeedback enables researchers to measure internal arousal in order to detect changes in bodily states. In stress research, there are four principal kinds of

instruments that supply valuable and reliable data. These instruments measure peripheral temperature, generally at the wrist or fingertips; muscle tension; brain waves; and skin resistance. Some of the most frequently used biofeedback machines are the galvanic skin response device (GSR), the temperature unit, the electromyograph analyzer (EMG), and the electroencephalograph analyzer (EEG) (Peek, 1987).

The GSR device measures autonomic arousal by recording the changing resistance of the skin. The sympathetically controlled sweat gland causes a student to perspire. The more the student perspires, the more the machine reacts. The GSR device, instead of recording data on a piece of paper, feeds the information to the individual via sound. The reduction of sympathetic arousal decreases pitch. When training with the unit, it is possible for the individual to explore both high and low levels of sympathetic arousal.

One type of temperature unit has a sensitive probe called a thermister, which is usually attached to the finger. The unit generally shows changes in skin temperature of 0.1 to 0.2 degrees Fahrenheit. Some temperature devices use liquid crystal technology and look like a wristwatch. The feedback loop closes when the information about the moment-to-moment temperature change is sent to the student via a visual signal, often a display of numbers representing the temperature at the periphery.

The EEG instrument records brain wave activity. The human brain produces a continuous output of minute electrical signals. Although the strength of these signals is so small that it is measured in microvolts, or millionths of a volt, the biofeedback devices can accurately detect and record the signals. Electrodes attached to the surface of the scalp detect the signals and amplify them thousands of times before analyzing the signals. If these amplified signals are recorded by the tracing pens of an electroencephalograph, the record, which is known as an electroencephalogram, appears to be a continuous wave of varying frequency and amplitude.

The EMG device measures and records muscle contraction and nerve conductance. An acceptable location for two of the sensors is on the skin over an appropriate muscle and at a convenient distance from each other. A third electrode, placed on the skin over a relatively neutral electrical tissue—bone, for example—serves as the electrical reference. The sensors transfer the electrical signals from the underlying muscle to the biofeedback instrument where such messages are amplified and summed over a convenient time period to permit activation of an auditory or visual signal. The EMG signal, generally used as an integrated value that represents the sum of the electrical activity under the sensors, indicates the amount of muscle activity for a specific time period.

By enhancing sensitivity to psychophysiological processes ordinarily too subtle to be sensed, the individual develops a measure of voluntary control over normally unconscious and involuntary bodily processes. Thus, the use of biofeedback machines is far-reaching in relaxation training as a way to measure stress and as a training procedure to give immediate feedback to the person seeking to develop self-regulation skills.

Self-Report Scales

Paper-and-pencil anxiety scales purport to measure stress. Anxiety scales depend on the cognitive interpretation and assessment of personal feelings and emotional responses. Scores on such scales have a relationship to physiological measures. According to biofeedback specialist Barbara Brown (1974), for every thought change, there is a physiological change in bodily functioning. Therefore, when thinking or perception changes, so do physiological characteristics of the body.

Electrodermal research shows the rapidity of change in the thought process as evidenced by the phenomenon of skin conductance (Peek, 1987). Students of biofeedback often refer to the immediate change in response to positive or negative thinking as "skin talk."

BUILDING A THEORY OF RELAXATION

For five years researchers at South Carolina State College investigated the use of relaxation training with middle school and high school boys and girls who were between the ages of 10 and 18 for the purpose of building a theory of relaxation for this age group. Prior to this study, preliminary work with relaxation training occurred. The research used a variety of methods for training, including biofeedback and exercises representative of guided imagery, autogenics, and deep breathing.

Researchers tested a number of assumptions for the progressive formulation of the theory. The assumptions were:

1. Relaxation, the amelioration of stress, is a learned skill and requires time to learn and practice to maintain.
2. Relaxation is a state that can be achieved by a variety of methods.
3. Peripheral temperature, a single, easily collected, physiological measure, is a reliable measure of the state of stress.
4. Skill at relaxation improves the performance of students in such areas as: learning, test taking, social interaction skills, self-confidence, self-management (fewer breaches of discipline and instances of disruptive behavior), lengthened attention span, and higher-order thinking.
5. Relaxation permits refocusing of the mind and deepens concentration, but only when relaxation is relatively complete.
6. The effect of relaxation training on performance is dependent on the level of arousal of the student during performance.
7. Performance relates directly to relaxation and indirectly to ambient stress in the performance area.

Findings from the research at South Carolina State College and findings from studies that were completed at other institutions became answers, in part or whole, to a series of questions about relaxation training. The questions were reformulations of the series of evolving assumptions. The subsequent reported findings shaped the theory that is proposed in the next section of this document.

Does Relaxation Training Decrease Arousal?

Relaxation training teaches students to elicit the relaxation response when they feel anxious and unsure of their ability to cope with stressors in the environment. The relaxation response, according to Benson (1975), is an integrated hypothalamic response resulting in generalized decreased sympathetic nervous system activity and, perhaps, increased parasympathetic activity. Characteristics of this relaxation response are bodily changes, such as decreases in oxygen consumption, carbon dioxide elimination, heart rate, respiratory rate, minute ventilation, arterial blood lactate; and, moreover, increases in skin resistance and skeletal muscle blood flow; and, lastly, slow alpha waves and occasional theta wave activity.

Although the literature regarding relaxation training with children is not as plentiful as it is with adults, a number of studies indicated that relaxation training helped students achieve the relaxed state. Measurements were by various types of biofeedback instruments. For example, some researchers (Dikel & Olness, 1980; Hershey, 1983; Hunter, Russell, Russell, & Zimmermann, 1976; Lynch, Hama, Kohn, & Miller, 1976; Suter, Fredericson, & Portuesi, 1983; Suter & Loughry-Machado, 1981) found that children raised their peripheral temperature from pretraining to posttraining, indicating relaxation. In one study, children lowered their temperature to show increased arousal (Suter & Loughry-Machado, 1981). That same study found that children were superior to adults in controlling skin temperature in the presence of biofeedback.

Several studies with children used EMG biofeedback, sometimes coupled with other types of relaxation training, to reduce muscle tension. The findings showed that with training, students reduced tension in various sets of muscles, as well as experiencing general body relaxation (Braud, Lupin, & Braud, 1975; Carter, Russell, & Whorton, 1978; Christie, Dewitt, & Kaltenbach, 1984; Khan, 1978).

Two studies used heart rate and finger temperature as measures of relaxation. Laird (1981) found that heart rate decreased and finger temperature increased as a result of relaxation training. Zaichkowsky and Zaichkowsky (1984) reported that fourth graders who received relaxation training for 6 weeks significantly decreased heart and respiration rates and increased finger temperature.

For researchers at South Carolina State College, wrist or finger temperature served as the measure of bodily state for several studies. Because such factors as room temperature and time of day affect peripheral temperature (King & Montgomery, 1980), corrections for these factors had to be made before the investigators could interpret the data.

One of the first studies at South Carolina State College investigated the correlation between the alpha brain wave state and wrist temperature. With middle school students as the subjects, researchers (Matthews, 1982) found a negative correlation between wrist temperature and the alpha state; that is, as brain waves decreased, wrist temperature increased. Although the relationship was significant, the correlation was not high. This study did show, however, that a number of changes in the body occur with relaxation.

Matthews (1984), using 532 rural seventh graders, instituted a daily 15-minute program of relaxation training in 10 middle schools. In each class for the 29 weeks of treatment, there was an increase in wrist temperature from 2 degrees to 3 degrees Fahrenheit from prereading to postreading. Because class temperature escalated, it is possible for one to assume that children within the class experienced varying degrees of relaxation as a result of relaxation exercises.

In another study (Matthews, 1986b), 69 high school students participated in a 10-week program that included keyboarding instruction preceded by relaxation training for the experimental groups. In both the 10-minute and 20-minute relaxation training groups, children experienced increases in finger temperature, with the 20-minute group showing more gains. From the data, researchers concluded that 20-minute exercises caused the body to experience deeper levels of relaxation than those of 10-minutes caused.

A study (Matthews, 1987b) with 67 seventh graders verified previous findings. This study lasted for 6 weeks and included 10-minute relaxation exercises before testing for an experimental group. The group always showed an increase in wrist temperature from measures taken before the relaxation exercise and those taken after relaxation.

There are enough empirical data to show that biofeedback and other types of relaxation training decrease arousal. Although there is limited information about some physiological measures associated with the relaxed state, wrist or finger temperature, heart rate, and measures of muscle tension are clear indicators. When individual measures are studied rather than group means, one finds a wide range of variation from the effects of relaxation training.

Which Relaxation Techniques are Appropriate for Use by Children in Eliciting the Relaxation Response?

There are two general categories for relaxation techniques that are used with children: physical and cognitive. Physical techniques include such methods as progressive relaxation and deep breathing. Among the cognitive techniques are autogenics, imagery, and biofeedback when it is used for relaxation training rather than for measurement of arousal. Because most techniques incorporate portions of other methods, for example, deep breathing combined with imagery, researchers have difficulty isolating one method from another for analysis. Also, the majority of relaxation trainers start with the physical techniques and progress to the cognitive ones (Smith, 1988), making the measurement of effects on a long-term basis conflicting. The rationale of trainers is that techniques, such as progressive relaxation, deep breathing, and stretching, are relatively undemanding and familiar to everyday movements (for example, making a fist, grimacing, shrugging the shoulders, inhaling and exhaling deeply, and stretching the arms), while autogenics (self-messages), imagery (guided or self-directed), and biofeedback require the higher skills of focusing, passivity, and receptivity.

Few studies exist that examine relaxation methodology with children. One study (Laird, 1981), however, used high school seniors and investigated the effects of progressive relaxation and finger temperature biofeedback, progressive

relaxation, values clarification counseling, and no treatment on anxiety. State anxiety scores and heart rate decreased significantly for the two groups using progressive relaxation in comparison to the other two groups. No significant differences occurred among the four groups on finger temperature measurements or on a self-report scale of general anxiety awareness.

Using middle school students, Matthews (1986a) found no significant differences between the methods of progressive relaxation, guided imagery, autogenics, and a control of watching a nonthreatening filmstrip. The researcher used biofeedback devices to measure the effects of the treatment. The three physiological measures associated with deactivation of arousal were peripheral temperature, muscle tension, and brain wave frequency. Although not quite significant (p=.0537), guided imagery tended to elicit the relaxation response better than progressive relaxation, autogenics, or the control as measured by corrected peripheral temperature. Schandler and Dana (1983), using female college students, had a similar finding about guided imagery on a self-report state anxiety scale when comparing three groups: imagery, biofeedback relaxation training, and control.

For the most part, research findings suggest that all of the strategies result in rather similar outcomes when groups of persons are compared (Borkovec & Bernstein, 1989). Because individual differences exist, some persons respond better to one technique than to another, but group measurement appears not to be sensitive to these differences in methodology. In the absence of large numbers of studies for empirical data, the answer to the question of which methods are more appropriate than others for children still partially remains unanswered. Both the physical and cognitive methods tend to decrease arousal, prompting one to agree with Benson (1975) that all relaxation techniques are interchangeable because they all evoke the relaxation response.

Does the Ability to Elicit the Relaxation Response Improve with Practice?

Because deep relaxation occurs on the low end of the arousal continuum, naturally, there is a point beyond which a student cannot relax without falling asleep. Relaxation training emphasizes being fully awake, alert, and in control of the body. Another key concept in relaxation training is self-regulation. The ability to relax further, therefore, depends on the level at which the student begins.

When working with groups of boys and girls having varying degrees of arousal and individualized rates of learning, one expects to see an effect from practice. Some adults report increasingly deep and rewarding levels of relaxation even after years of practice (Lichstein, 1988; Shapiro & Walsh, 1984).

A number of studies with youth tend to support the notion of improvement with practice. These studies used various types of biofeedback instruments to measure changes as training progressed.

One study investigated the degree that students could retain their ability to reduce muscle tension without daily practice and the extent to which periodic retraining would be a practical and effective way of retaining the skill (Chen,

1983). After training with frontalis muscle biofeedback relaxation, the researcher divided the experimental group into three groups: (1) receiving practice every two weeks, (2) receiving practice every 4 weeks, and (3) receiving no practice. All groups retained the ability to reduce muscle tension, but the group with retraining every two weeks perfected the procedure by achieving the lowest levels of tension.

Kappes (1983) found substantial improvement in the ability of males and females to relax after eight 20-minute sessions in a 16-session program. This researcher used peripheral temperature as measured by a finger temperature unit and muscle tension as measured by EMG biofeedback for evaluation.

Using finger temperature to measure relaxation, 8 college freshmen with elevated blood pressure learned to reduce systolic pressure after 14 training sessions (Bertilson, Bartz, & Zimmerman, 1979). Likewise, Jasnow (1983) reported beneficial effects of time with sixth graders in a relaxation training program of fifteen 30-minute sessions.

Ability to elicit the relaxation response at will suggests that a person has some control over physiological functions. With ability to control, a person should be able to activate arousal as well as deactivate it. Lubar (1985) reported work in which he taught children with learning disabilities to generate more brain waves per second, thus achieving the beta state. His work showed that EEG biofeedback training for learning-disabled students is a relatively slow process, typically requiring a minimum of 4 months and possibly continuing for a year. With the skill of increasing arousal, then, practice is of value, also.

Practice proved to be beneficial in research at South Carolina State College. In the study lasting 29 weeks, a time-series graph showed the weekly average increase of corrected wrist temperature for the experimental children in nine middle schools (Matthews, 1984). Differences between prereading and postreading for each day showed a gradual increase in temperature as the study progressed, indicating that higher levels of relaxation were obtained with practice. Another program with a duration of 6 weeks with middle school students (Matthews, 1987b) validated the findings from the previous study. Children tended to improve their skill the longer they stayed in a program.

In a final study (Matthews, 1988) in which awareness of bodily states was emphasized, children attempted to assess their bodily states and to guess their temperatures. After measuring to see how well they cognitively assessed themselves, students attempted to change their actual temperatures in the direction of the assessment. The study with seventh-grade children taught self-regulation for 7 weeks and then provided weekly follow-up sessions for practice throughout the school year. As the study progressed, students became better at closing the gap between cognitive assessment and actual temperature measures. With the assistance of the trainer, students were able to go in both directions on the arousal continuum; however, they had difficulty achieving activation on their own.

Even in the 9-month studies, there were no observations of the floor and ceiling effects. Children continued to improve in self-regulation throughout the

entire studies, as measured by biofeedback devices in relation to peripheral temperature, brain waves, muscle tension, and other physiological conditions. Practice, therefore, had a beneficial effect in improving skills of self-regulation. According to Stroebel (1982), the more one practices, the more the skills become automatic.

Is It Better to Use Live or Taped Relaxation Exercises?

Determination of the preference of use of live or taped exercises in a school program depends on a number of factors, for example, training of teachers and counselors or money allocated to the program. Beneficial results tend to occur with the use of either method (Matthews, 1984, 1986a; Smead, 1981).

The literature (Hillenberg & Collins, 1982) showed approximately the same number of studies using a person verbalizing the exercise as it did studies with professionally prepared taped programs. Many of the studies using exercises on tape had positive results. Paul and Trimble (1970) found, however, that relaxation instruction provided live by a person was clearly more effective than tape-recorded instructions. Furthermore, more recent research (Beiman, Israel, & Johnson, 1978; Lashley, Gamble, Grenier, Roundtree, & Elder, 1987) agreed with this finding. Lehrer (1982), in an evaluation of all types of progressive relaxation with adults, found that tape-recorded instructions were completely ineffective as a method of teaching relaxation. In the studies supporting the use of live instruction over taped exercises, those persons conducting exercises live were professionals who were trained in relaxation techniques. It is possible that, in schools, teachers and counselors lack the necessary experience and need to utilize exercises prepared by people who are specialists in the field.

Whether to use live or taped techniques is likely to depend on the situation. Both procedures show promise. With training, however, humans are superior to machines.

What Is the Most Efficient Length of Time for a Relaxation Exercise?

Because time is a precious commodity for students, educators have a concern for information about length of exercise for maximum mental, social, and physical benefits. Professionally prepared relaxation exercises on tape for children tend to be from 15 to 30 minutes in duration (Lowenstein, 1979; Lupin, 1977), leading one to believe that tapes of those lengths are appropriate for this population in regard to time. For training, the literature gives no information on length of time for exercises. When normal children are learning relaxation skills, the training most likely occurs in groups, within the overcrowded curriculum, making a few minutes become the deciding factor in whether or not to implement a program. Subgroups of the school population, such as disruptive children or learning-disabled students, may receive training on a one-to-one basis with a counselor or therapist, a situation in which time may be less of a factor. Therefore, when designing a stress management program, one must consider length of time for relaxation exercises.

In the absence of data to guide practice in schools, Matthews (1986b) investigated the length of time for a relaxation exercise that would be needed for students to elicit the relaxation response, as measured by peripheral temperature. Using high school students, she examined the differences between readings before and after relaxation during the 10-week program. In addition to a control group, there were two experimental groups, one receiving 10-minute exercises and one receiving 20-minute exercises. Both groups raised finger temperature from prereadings to postreadings and exhibited significantly higher gains in peripheral temperature than did the control group. As would be expected, 20-minute exercises caused students to reach deeper levels of the relaxed state. However, both groups demonstrated significant gains in keyboarding achievement when compared to their counterparts.

Therefore, researchers concluded that, for school use with the target population, 10-minute exercises are of sufficient duration for relaxation training. In some cases, after training and with practice, the relaxation response changes to the relaxation reflex (Stroebel, 1982), requiring even smaller amounts of time.

Can Peripheral Temperature Be Used as a Valid Measure of Ambient Stress in Schools?

Peripheral temperature appears to change in relationship to cognition and emotions. Boudewyns (1976), in a study of the effects of relaxation and stress on finger temperature, found that finger temperature increased under assumed relaxed conditions (taped relaxation instruction) and decreased under assumed stressful conditions (threat of shock). Matthews (1984), in initial research, also found that wrist temperature changed from prereading to postreading when children engaged in a relaxation exercise.

Ambient stress refers to the anxiety felt by persons working and learning in a school. Within the common experience of educators is the knowledge that individual schools, even within the same geographic region, differ in terms of the demands that they impose on students.

With the idea that levels of general anxiety in schools should differ and that finger temperature, adjusted for time of day and room temperature, is a reasonable candidate for measuring arousal, Matthews (1987a) investigated correlates of school stress. Students (5,926) in classes selected at random in 11 volunteer schools (Grades 7-12) throughout the midlands of South Carolina became the sample. In this study, Matthews correlated common variables used in describing schools (curriculum, teacher expectation, student expectation, anxiety scale, achievement, and district characteristics such as drop-out, expulsion, suspension, and retention rates) with corrected peripheral temperature to identify those variables that associated with school stress. Measurements of participating students in the schools in the study varied in corrected peripheral temperature, as would be the case if ambient stress were different. Also, temperature tended to decrease at higher grade levels, as one might expect, as education becomes more relevant to goals and as school becomes a more negative experience for many students (Dunn, 1968). There was a significant but low correlation between a

paper-and-pencil anxiety scale and corrected peripheral temperature, giving some evidence that temperature might be used as a measure of stress. Certain curricula, noted for difficulty, influenced peripheral temperature in directions suggestive of increasing stress of the learner. Black students varied in peripheral temperature in proportion to the number of white students; that is, black students had lower temperatures in schools in which they were in the minority. As the literature showed for other measures of stress (Gjesme, 1981; Morris, Finkelstein, & Fisher, 1976; Payne, 1984; Price, Jurs, Jurs, Rhonehouse, & Isham, 1985; Richmond & Millar, 1984; Stone, 1986), corrected peripheral temperature was significantly lower for girls than for boys, indicating more stress in school for females. In this study, achievement and district variables proved to be unrelated to peripheral temperature, however.

With the lack of strong support, one cannot assert the validity of corrected peripheral temperature as a sole measure of school ambient stress. However, the results of the study contribute some evidence in support of using finger temperature as one measure of the phenomenon.

Do Behavioral Changes Accompany Increased States of Relaxation?

Positive and negative changes occur with increased states of relaxation. Children may improve their self-management skills, develop more positive self-concepts, and reduce general and targeted anxiety levels. Students who have high anxiety tend to improve in achievement with relaxation training, but children who function at moderate or low levels of anxiety may be relaxed below the range of optimum performance. Comprehensive research elucidates these findings.

Self-Management

Relaxation training tends to affect socially approved, as well as inappropriate, behavior patterns of children. Alertness and attention spans may improve (Dunn & Howell, 1982; Kirk, 1981; Rivera & Omizo, 1980); young people in particular need these qualities to achieve. Relaxation possibly assists one in remaining calm and self-assured with the implication that young people can control their behavior in potentially stressful or charged situations (Margolis, 1987). According to the literature, inappropriate behaviors that improved with various relaxation methods were incidences of disruption (Corder, Whiteside, & Haizlip, 1986; Galyean, 1980, 1982; Matthews, 1982, 1984; Nenortas, 1986; Oldfield, 1986; Weimer, 1987); boasting, verbally threatening, or spoken humiliation of others (Miller, 1982); absenteeism and tardiness (Monaco, 1983; Nenortas, 1986); hyperactivity, including impulsivity (Dunn & Howell, 1982; Gerler & Omizo, 1981; Kratter & Hogan, 1982; Krieger, 1986; Omizo & Michael, 1982); inattentiveness (Oldfield & Petosa, 1986); and other examples (Walton, 1979).

Although there is overwhelming empirical evidence that behavior or skill in self-management improves with various forms of relaxation training, three studies found conflicting results. Wright (1978), investigating the effectiveness of the procedure on discipline referrals with fifth and sixth graders, found no significant

differences between experimental and control children. When teachers responded to a behavior checklist, Matthews (1988) found no differences in scores between trained children and untrained children. Also, Hershey (1983) reported no significant changes in attending behavior after using the procedure with learning-disabled children.

The relaxation response has a tendency to reduce the level of bodily arousal, the condition or state associated with action. While the reason is not yet unquestionably established and the functioning of involved neurotransmitters in the brain remains unclear, it is possible that relaxation effects release of secretions that regulate or trigger the emotions, the affective nature of human beings that exerts control over behavior (Messecar, 1983) .

The literature appears to support relaxation training as a method for changing socially and academically inappropriate behaviors of children. Although there are a few studies that show no support, the majority of the investigations do.

Self-Concept

Anxiety appears to impede the development of a positive self-concept (Cowles, 1984; Phillips, 1978). Bledsoe (1964) found significant negative correlations between anxiety and self-concept for students in the fourth through sixth grades. Findings from research relative to students in the fourth through eighth grades reflected the negative relationship between self-concept and measures of trait (general) anxiety (Cowles, 1984; Jones, 1973; Lewis & Adank, 1975; Padwal, 1984) and of state (situational) anxiety (Jones, 1973; Lewis & Adank, 1975; Padwal, 1984; Sousa, 1981). Although there appears to be a significant negative relationship between levels of anxiety and self-concept scores, some correlations are rather low (Lewis & Adank, 1975; Matthews & Odom, 1989). For example, Matthews and Odom (1989), found correlations with the total score for state anxiety and two subtests for trait anxiety, Home-Parent and School-Academic, to be -.36, -.27, and -.26, respectively.

Perhaps because of the significant but low correlations between anxiety and self-concept, literature regarding the effect of relaxation training on the self-concept of youth is conflicting. Zaichkowsky, Zaichkowsky, and Yeager (1986), using four biofeedback measures coupled with mental imagery and deep breathing, found no significant effect for the training on self-concept in relation to students in the first through the fourth grades. Kubiak (1988) instituted a program of stress inoculation training with adolescents, but, like Zaichkowsky, Zaichkowsky, and Yeager, found no significant effects for the training on self-concept. Hershey (1983), using finger temperature as a measure of relaxation, reported a trend among learning-disabled students in primary and intermediate grades to improve self-concept; however, the increases were not significant. Ragan and Hiebert (1987) found no significant effect for Kiddie QR (Quieting Response) as a relaxation technique with primary school children on the total score of the *Student's Perception of Ability Scale*; however, there was a significant main effect for the School Satisfaction subscale for the treatment group.

To the contrary, evidence exists to substantiate the use of various relaxation techniques to produce a positive self-concept. Using three experimental groups of students, ages 7 to 11, Krieger (1986) employed EMG biofeedback coupled with either progressive muscle relaxation, imagery, or autogenics to produce significant positive differences between experimental groups and control students in regard to self-concept. In a study of 35 eleven-year-old underachievers having learning problems, Carter (1979) produced significant gains in self-concept with EMG training. Oldfield (1986), working with public school students in Grades 4 through 6, found that students receiving training in the use of the relaxation response significantly increased total self-concept scores on the *Piers-Harris Children's Self-Concept Scale* in comparison to a control group, with a particularly high difference being evident for the Intellectual and School cluster of the scale. Other research showed significant gains in self-concept of experimental students as opposed to the control students when anxiety management training was used with sixth and seventh graders (Wilson, 1981; Wilson & Rotter, 1986).

As with other research, studies by Matthews (1984, 1988) produced conflicting results. The study of 1984 involved 532 rural seventh graders from 10 different schools. For relaxation training, she used audio-taped exercises that incorporated progressive muscle relaxation and imagery. There was no significant difference between experimental students and control students on measures of self-concept according to the *Self Observation Scales*. One finding of interest, however, was that girls in the experimental group had significantly higher scores than the girls in the control group for Social Confidence, Peer Affiliation, and Self-Assertion subtests, measures related to interpersonal skills. The latter study (Matthews, 1988) refuted the findings of the previous one when both boys and girls were examined. Children in the Grades 6 and 7 participated in a self-regulation program that included practice in raising or lowering finger temperature to meet various states along the relaxation-arousal continuum. Students in the experimental group had significantly higher mean scores than did students in the control group on the General Self and School-Academic subtests, as well as on the total battery, of the *Coopersmith Self-Esteem Inventory*.

Results of research relative to the use of relaxation techniques for improving self-concept appear to be heterogeneous. Although empirical data regarding improvement of self-concept in general is conflicting, there appears to be evidence that relaxation training is nevertheless effective in increasing the perceptions students have of their ability to perform in school—a finding that suggests that through instruction in relaxation techniques, self-concept rises, and ultimately academic achievement may improve (Padwal, 1984).

General Anxiety

General anxiety refers to any nontargeted anxiety as opposed to targeted anxiety (for example, test anxiety). Specifically, general anxiety includes state anxiety, a transient anxiety relative to a specific situation, and trait anxiety, the deep-seated individual predisposition to anxiety.

Studies reported in the literature reflect discrepancies in findings regarding the effect of relaxation training on general anxiety. Two researchers (Davis, 1988; Kubiak, 1988) found no significant differences on either state anxiety or trait anxiety as a result of relaxation training. Davis (1988) used progressive muscle relaxation with preadolescents while Kubiak (1988) used stress inoculation training with adolescents. Zaichkowsky and Zaichkowsky (1984), using progressive muscle relaxation combined with mental imagery and deep breathing as the relaxation technique, reported that an experimental group of fourth graders did not differ significantly from the control group in the reduction of either state or trait anxiety. Zaichkowsky, Zaichkowsky, and Yeager (1986) found no significant effects of similar relaxation training on state anxiety for students in Grades 1 through 4, even though students demonstrated significant control over three physiological measures normally associated with state anxiety.

Other studies were more supportive of a perceived reduction of anxiety as shown on a paper-and-pencil test. Hiebert and Eby (1985) successfully decreased both anxiety measures, state and trait, with relaxation training with students in Grade 12. Conger (1986) implemented an anxiety reduction program including progressive muscle relaxation combined with imagery and significantly reduced state anxiety scores for fourth-grade students, noting that students having the highest anxiety levels were the most nearly successful in lowering their anxiety scores. Laird (1981) reported that two groups of high school juniors (one group using progressive muscle relaxation and the other group using progressive muscle relaxation coupled with biofeedback) decreased state anxiety significantly in comparison to two other similar groups of students (one group receiving values clarification counseling and the other receiving no treatment). When using relaxation training for one group of sixth graders and rational emotive therapy for another group, Jasnow (1983) found that both treatments were effective in reducing trait anxiety in comparison to the control. Ragan and Hiebert (1987) found a significant decrease in trait anxiety for third graders as a result of training with the Quieting Response (QR). Smead (1981), when using either progressive muscle relaxation or tape-recorded relaxation exercises with two groups of sixth graders, reduced state anxiety in both experimental groups in comparison to a control group; however, the researcher found no significant differences for trait anxiety or student anxiety as reported by teachers on the *School Behavior Check List*. With a sample of 30 gifted students in the sixth and eighth grades, Roome and Romney (1985) used tape-recorded progressive muscle relaxation instructions for one group and EMG biofeedback coupled with mental imagery for another group to produce significant differences in the lowering of state anxiety for these two groups from pretest to posttest; however, they were unable to decrease trait anxiety from pretest to posttest. Only the biofeedback group differed significantly from the control group on state anxiety, although the progressive muscle relaxation group approached significance, and the two experimental groups exhibited no significant difference on the measure of state anxiety.

In reviewing the literature, it appears that relaxation training is effective in lowering levels of state anxiety but is ineffective in lowering levels of trait anxiety, as would be expected, because trait anxiety is representative of inherited characteristics. A study by Matthews (1988) of students in the sixth and seventh grades lent credence to the findings of other researchers. The measurement of anxiety in this study was according to the responses of students to questions on the *State-Trait Anxiety Inventory for Children.* In comparison to a control group, students who participated in a self-regulation program for 9 months reported significantly lower scores on state anxiety ($p = .0244$); however, there was no significant difference between the two groups on trait anxiety.

The literature substantiates the use of relaxation training for managing situational anxiety or stress for youth. Progressive muscle relaxation, a method easily understood by children, appeared most often in the literature as the chosen method of relaxation for the reduction of state anxiety.

Test Anxiety

Several studies with children demonstrated a reduction in test anxiety as measured by various self-report instruments. For example, Pruitt (1986) found a significant reduction in scores of two experimental groups in comparison to a control group of ninth-grade students on the *Test Anxiety Inventory* when two types of relaxation training were used. The two types were stress inoculation training and systematic desensitization instruction. Likewise, Wilson and Rotter (1986), using students in the sixth and seventh grades, decreased test anxiety significantly, as measured by the *Test Anxiety Scale for Children* after a relaxation program. The reduction of test anxiety in another study was via two types of muscle relaxation training that proved beneficial in decreasing test-related anxiety in elementary school children (Smead, 1981). The two treatment groups had significantly less anxiety than did the control group on the *Test Anxiety Scale for Children.* A study by Robinson (1983), utilizing a paper-and-pencil test, showed similar findings to the other studies. Relaxation-desensitization exercises as a treatment method proved to be successful in reducing the anxiety experienced by many students before testing.

A final study examined students a year after training in a self-regulation program for test anxiety (Deffenbacher & Michaels, 1980) to see if the students retained the skills of anxiety reduction. The extended follow-up revealed that the original significant reductions in debilitating test anxiety, as measured by the *Achievement Anxiety Test,* for the students trained in relaxation procedures were maintained a year later. The qualitative differences on the *Fear Inventory,* on which relaxed groups reported experiencing only a little test anxiety and on which the control group indicated a moderate to severe degree of test anxiety, gave support to this finding.

Although cognitive measures, such as paper-and-pencil tests, depend on the ability of students to sense anxiety felt in the body and their willingness to be truthful about feelings related to stress, this type of measurement is helpful in the study of the phenomenon. Some authorities (King, Stanley, & Burrows, 1987;

Smith, 1988) think that both cognitive and physical measures are necessary in order to understand stress.

Achievement

The relationships among relaxation training, anxiety, and performance appear to be complex, no matter whether performance is motor, mental, or a combination of the two. Scores on standardized tests and paper-and-pencil anxiety scales showed a negative correlation with academic performance (Dew & Galassi, 1984; Matthews & Burnett, 1989; Medin, 1986; Padwal, 1984); that is, as perceived anxiety increased, performance decreased. Although most findings were significant, careful examination of the data indicated that the correlations were moderately low, allowing for other contributing factors, such as intelligence, study, practice, and perseverence. As reported earlier, Matthews (1987b) discovered that physiological arousal could be too low for maximum performance. In a study in which middle school children engaged in a relaxation exercise immediately before testing, the children who had the highest wrist temperatures (an indication of extreme relaxation) tended to do less well than those having lower temperatures (an indication of more arousal), leading to the conclusion that relaxation can be overdone to the point of destroying motivation and desire to achieve. Within the control (no-treatment) group, children who were more relaxed tended to perform better than those whose natural functioning was one of high arousal. Spillios and Janzen (1983), using learning-disabled children having low anxiety, found that, after a relaxation program, students decreased scores on the Reading Comprehension subtest of an intelligence test from pretest to posttest. When studying motor skills, Gmelch (1983) examined the performance of Little League players in relation to arousal. This researcher found that batting performance increased with arousal level when the ability of the pitcher was constant but decreased as the ability of the pitcher increased and the arousal level of the batter stayed the same. These findings imply that the understanding of performance is intricate.

Stress, in relation to performance, can be both facilitating and debilitating, depending on the arousal level of the individual and the perceptions that individual has about performing the task (Butterfield, 1964). For example, when aroused during testing, low-anxious college students reported that they viewed their arousal as facilitative while high-anxious students reported their arousal to be debilitative and, thus, engaged in more task-irrelevant thinking and negative ruminations than did the low-anxious students (Hollandsworth, Glazeski, Kirkland, Jones, & Van Norman, 1979). Likewise, high-anxious students in another study performed better under nonstressful test-taking conditions than under stressful conditions; however, the reverse was true for the low-anxious students (Sarason, Mandler, & Craighill, 1952). A study by Bryan, Sonnefeld, and Grabowski (1983) indicated that learning-disabled subjects were more anxious than their nondisabled counterparts and that their anxiety was significantly related, negatively, to reading and mathametics achievement scores. Hamann (1982), in support of the contention that anxiety can be facilitative, found that

students who studied a musical instrument for 6 or more years tended to perform better in high-anxiety situations than in low-anxiety situations. Rubenzer (1984) reported that physiological anxiety in gifted students in the fifth and sixth grades correlated negatively to cognitive performance on divergent and reasoning tasks but positively to simple number recall tasks. Similarly, Robinson (1983) reported that students do better on examinations when anxiety is at a productive, or optimum, level. Spielberger (1971) noted that highly anxious people, when confronted with stressful situations, improved performance only if they were specially skilled in tasks required to cope with the stressful situaton. Therefore, it appears that anxiety facilitates performance on tasks of low complexity or in which the individual is already skilled and that high arousal interfers with higher-order thinking.

Relaxation training appears beneficial for use with highly anxious students in improving scores on intelligence tests. Carter (1979) found that 11-year-old students having learning problems significantly increased their scores on the *Slosson Intelligence Test* after receiving EMG biofeedback training. Little and Jackson (1974) conducted a study of students in the seventh and eighth grades. Students in each of three experimental groups (attentional, or focusing, training; progressive relaxation training; or attentional training combined with progressive relaxation training) significantly increased their scores on the Similarities subtest of the *Weschler Intelligence Scale for Children*. Rubenzer (1984) used EMG biofeedback in conjunction with progressive relaxation tapes with gifted students in the fifth and sixth grades. In comparison to control students, the experimental students scored significantly higher on posttreatment scores on all cognitive measures on several tests of intelligence, including the *Weschler Intelligence Scale for Children*. Matthews (1987b), using guided imagery training with normal middle school students, found that experimental students significantly outperformed control students on three subtests (Verbal Analogies, Figure Classification, and Figure Analysis) of the *Cognitive Abilities Test*.

In addition to increasing scores on intelligence tests, relaxation training indicates effectiveness for improving achievement of both learning-disabled and normal students in other areas. Auditory memory, eye-hand coordination, and handwriting legibility improved in a group of underachievers in elementary school when students decreased muscle tension (Carter, 1979). Dunn and Howell (1982) reported that hyperactive boys who ranged in age from 6 to 12 significantly lowered muscle tension and increased scores on digit span and coding tests after receiving 10 relaxation sessions involving either EMG, relaxation tapes, or a combination of the two. Wilson and Rotter (1986), using anxiety management training as opposed to study skills training, reported that students who participated in the anxiety management training lowered anxiety scores and significantly improved performance on a coding test. Galyean (1982) used imagery with junior high school students who ranked in the lowest quarter percentile of reading ability to increase significantly achievement in Spanish. Frey (1980), using autogenics for 1 year with high-anxious poor readers, reported a significant increase in achievement as measured by a diagnostic reading and spelling test for

fourth and fifth graders. Tenth-grade basic education students who participated in a relaxation training program using audiotapes that included imagery, deep breathing, and progressive muscle relaxation significantly outperformed control students on responses to literal level questions to test recall of information obtained from narrative prose (Zenker & Frey, 1985). Barnes (1976) reported that auditory relaxation training incorporating music significantly affected didactic recall of classroom material by high school psychology students. Matthews (1986b) used guided imagery in conjunction with deep breathing to improve keyboarding ability of high school students.

A few studies showed no significant improvement in achievement resulting from relaxation training. Spillios and Janzen (1983) found that learning-disabled students having high anxiety, as opposed to a low-anxious control group, had gains in Reading Recognition, Comprehension, and Mathematics subtests on the *Peabody Individual Achievement Test* after relaxation training, but the gains were not signficant. Matthews (1987b) found that relaxation did not significantly affect performance of students on weekly teacher-constructed achievement tests measuring critical thinking skills when imagery was the method of relaxation. Likewise, similar results occurred from alpha training with students (Matthews, 1982); the ability of students to speak and read French did not improve with relaxation training. Matthews (1982, 1984) also found no significant increase in performance of middle school children on standardized achievement tests when alpha training and imagery were used, respectively.

Because students differ in their anxiety levels, Matthews (1988) designed a study with middle school children that focused on self-regulation, that is, adjusting bodily states in accordance with the demands of the task or situation. She trained the experimental children during physical education for 7 weeks to obtain several skills: (1) to assess bodily states, (2) to elicit the relaxation response on demand, and (3) to arouse the body at will. After the initial 7 weeks of intensive training, she reinforced the skills of self-regulation once per week in a 50-minute period for the duration of the study, including some theory about the physiology of stress, homeostastis, and biochemistry of the body. Almost all of the students learned to evoke the relaxation response without the assistance of the trainer and some evoked arousal on demand. Concurrently with the reinforcement activity, a thinking skills program was in operation in the language arts class for both the experimental group and the control group. The program taught the sixth- and seventh-grade students the skills of verbal classification, sentence completion, verbal analogies, quantitative concepts, number series, equation building, figure classification, figure analogies, and figure analysis. To measure achievement, the instructor used a series of teacher-made tests and a standardized test, the *Cognitive Abilities Test*. After the first three teacher-made tests, the experimental children outperformed significantly the control children in the remaining six tests, indicating that they were using the self-regulation skills learned during physical education period. However, scores on the *Cognitive Abilities Test*, which was administered at the conclusion of the treatment, were not statistically different for the two groups. The findings from this research are

conflicting with former research and show the complexity of learning. On the one hand, children tended to use the skills of self-regulation for learning and assessment in the relaxed atmosphere of the classroom, and on the other hand, they apparently made little transfer of the skills to a timed, standardized test situation.

The findings from all research appear to indicate that students perform best within a range on the arousal continuum. Relaxation training administered to the whole class before instruction or testing helps high-anxious children academically but hinders low-anxious students. Programs of relaxation or arousal training may help learning-disabled children as they try to adjust to deficits in brain functioning. Locating the range within which students function and training them to stay in that range may be the key to enhancing performance.

THEORY OF RELAXATION

The Theory holds that relaxation training produces a potentially residual skill and results in observable behavioral changes. Relaxation training is one appropriate procedure for the management of stress, thus decreasing arousal. Whole-class instruction is appropriate only during training. The amount of change in arousal as a result of relaxation training depends on the starting point, with high-anxious persons being capable of more change than low-anxious ones. Middle school and high school students evoke the relaxation response easily but have difficulty evoking arousal on demand. Relaxation techniques classified as physical, mental, or combinations of physical and mental are suitable for training; as training and practice continue, cognitive methods increase focusing, passivity, and receptivity. Practice creates an incremental effect. A program of relaxation training administered by a specialist, such as a counselor or teacher, remains more effective than programs on cassette tapes. During training, relaxation exercises of 10-minute duration yield beneficial results. Biofeedback instrumentation enhances the selected measurement of relaxation states.

The second portion of the Theory deals with observed behavioral changes. The procedure improves self-management skills. State anxiety decreases with training. For girls, relaxation training increases social interaction skills. Self-concept becomes more positive with relaxation training. The procedure reduces test anxiety, thus increasing achievement. Relaxation training initiates the process that allows students to achieve the optimum level on the arousal-relaxation continuum for maximum potential performance and to remain in that state during performance. During the waking state, high levels of relaxation and high levels of arousal or anxiety are detrimental to performance. Performance is related directly to states of relaxation or stimulation and indirectly to ambient stress in the performance arena.

The Theory does not hold in the area of ambient stress in schools. Researchers asserted that peripheral temperature of students, a physiological measure, was a reliable assessment of school environmental stress. Peripheral temperature, however, might be used as a weak indicator.

It is strongly evident that relaxation training must be part of the regular school curriculum. However, children possibly must develop the skill so proficiently that they are able to increase and decrease arousal in accordance with the activity or demand of the situation. Control of this nature is so comprehensive that children should begin in kindergarten and continue through high school, perfecting the skill until it becomes virtually automatic.

Research in the area of activation, instead of relaxation, and learning is a potential emphasis. Group application is an unexploited resource.

SUGGESTIONS FOR THE IMPLEMENTATION OF A STRESS MANAGEMENT PROGRAM

Advocates for a system-wide stress management program have claimed success for over 10 years (Galyean, 1983; Severson, 1976). While the availability of resources may vary considerably from jurisdiction to jurisdiction, no unit is too poor to incorporate stress management programs as long as teachers are sufficiently trained, and, desirably, a counselor is available. The more affluent the system, the more such personnel will be present in optimum ratios; however, even the smallest and most impoverished area, where stressors may be perceived most dramatically, can provide measures to assist students in developing their own coping skills. With sufficient and continuing practice, pertinent aspects of such skills will become virtually automatic in the presence of waves of sudden, disorderly, unpredictable, and violent stressors. Youth have a natural resilience, provided the impact of traumas is not demolishing, but such resilience needs guiding assistance within the school setting. Girls, especially, suffer more stress during their preadolescent and adolescent years than boys, and such research findings indicated even more need (Price et al., 1985). The need of girls involves special assistance in areas that boys may not require, as borne out by the literature reporting data gained by both physiological and cognitive measurements.

Gaining importance and momentum, therefore, is a movement to increase inservice teacher education, with corresponding adjustments in teacher education curricula at specializing institutions. The inservice programs will become increasingly important, not only to keep teachers current but also to collect those who have slipped through cracks in the 5-year credentials programs now appearing to become standard, universal requirements.

Relaxation training should and can now be instituted independent of mandates from the state or office in the school district, with distributed formulated objectives. Whether or not such is yet the case, the counselor remains pivotal. Guidance training begins early, with teacher-directed imagery. It is best to have a regular schedule because an aim is to establish a predisposition to routine and acceptance of a regimen perceived as both natural and beneficial. Students in the preadolescent and adolescent levels will naturally be more interested in short-term results, but as discipline and practice develop in the maturing process, the older students will perceive long-term benefits and the ease

in transferring skills to venues or times deemed practical to the participant who, by this time, is in control.

Before then, however, where will the preadolescent begin within the school situation? Under the supervision of the counselor, certain classes should be targeted for emphasis, although all teachers should make room within the regimen of the day for teacher-directed relaxation, preferably regular 5-minute to 10-minute intervals both morning and afternoon. Obvious classes, which should change from year to year or from level to level, lending themselves to relaxation training are physical education, health, shop, art, music, and social studies. For older students, classes may include mathematics, English, foreign language, business, economics, geography, and certain sciences. Under skillful teachers, classes in biology, physics, and chemistry provide extraordinarily effective places. A caveat is that the counselor should rotate targeted classes so that relaxation training becomes identified with self, not with a favorite or disliked teacher or subject. Remarkably, stress management requires little or no equipment at lower levels, and nothing special at higher grade levels. The limitation will not be in the matter of appropriations of money, but in the expenditures of imagination and commitment.

It should be the responsibility of the counselor to coordinate all such activities and to determine which teachers are employing effective strategies and those who may need assistance. With firmness yet diplomacy and tact, the counselor can allay fears and anxieties and can encourage faculty in their own stress-reduction programs. If there is even a slight chance that parental reinforcement is available, the counselor coordinates such participation. Some parents may have the time and means to assist and may, under the guidance and scheduling of the counselor, assist in a regular and voluntary program. The counselor, for example, if computers are prominent on school premises, may also wish to bring in community personnel as guest speakers to demonstrate computer-related stress and the methods used by adult role models on the job.

No counselor can predict the future, especially in the area of stressors. Some social and political trends, at this writing, seem potentially dangerous. Economic conditions are simultaneously stagnant and unstable, while elsewhere nations enjoy prosperity. Technology, which had been employed originally to increase productivity and to alleviate some economic stressors, is now producing permanently disabled employees, for example, in the communications media requiring intensive keyboarding. The counselor, then, in view of the realities of a future outstripping the futurists, can early be the difference between success or catastrophe as students leave the school system and enter the work force. Indeed, the counselor cannot predict the future, but such a professional, ably working in a supportive system, can assist students in acquiring adequate coping skills for a world that most certainly will pose destructive and increasingly costly stressors.

CONCLUSION

The purpose of this document was to synthesize the research in the literature with that of investigations by researchers at South Carolina State College in order to develop a Theory of Relaxation for Rural Youth. First, this work demonstrated the large number of stressors found in the life of a young person. Next occurred an examination that related stress to the psychophysiological characteristics of the body. The third section comprised the determination of answers to questions in relationship to the literature. Gradually, a theory emerged, giving credence to the last section, with its suggestions for implementing a homogeneous, continuing school program.

The research, therefore, provides a guide for stress management programs that might be practically implemented in the schools. The synthesis of findings showed that relaxation training is one appropriate method for dealing with ubiquitous stressors found in the environment. Teachers and counselors, with training and skill, can teach students to evoke the relaxation response on demand of a specific or general situation. Although the method appears simple, indeed, the acquisition of self-regulation skills is a surprisingly complex process. To achieve both the arousal and relaxed states may take years of training, thus indicating that these skills, like any others, become an expansive progression.

Society, in its fluid nature, involves the physical aspects of the body and senses as a stressor on children. Therefore, the theory is applicable regardless of societal changes that may occur.

For self-regulation training to be effective, it must permeate the total curriculum. Stress itself is now perceived as a fluctuating idea, with stress having important cognitive and physical impact on the student. Stress is dynamic, changing with the development of cognition and the resources of the body. The body, in turn, provides an evaluation of the resources available for dealing with stress.

The Theory evolved into the formulation that relaxation training is in fact a skill that can be taught and practiced, collectively and individually, much as any other skill, with demonstrable positive and continuing behavioral consequences.

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